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A New Subspecies of the Bat *Eumops auripendulus* (Chiroptera: Molossidae), from Argentina and Eastern Brazil¹

by Judy L. Eger²

Abstract—The mastiff bat, *Eumops auripendulus* (Chiroptera: Molossidae) occurs from southern Mexico to northeastern Argentina. In eastern Brazil and northeastern Argentina is a population that is morphologically distinct from other *Eumops auripendulus*. The new subspecies is geographically isolated from, and larger than *Eumops a. auripendulus* which occurs from the Amazon region of South America to southern Mexico.

[Chiroptera; Molossidae; *Eumops auripendulus*; subspecies novum; systematics.]

The mastiff bat, *Eumops auripendulus* (Shaw), first named the slouch-eared bat by Pennant (1793), was described by him from a drawing made by Buffon in 1789 (see Goodwin, 1960). Subsequently, Shaw (1800) renamed this species *Vespertilio auripendulus*. The specimen sketched by Buffon (1789) was from Cayenne, French Guiana, and therefore Cayenne is the type locality. According to Husson (1962), authors publishing since 1876 considered *Dysopes abrasus* Temminck (1827) to be the same species as *V. auripendulus*. But Husson (1962) extracted the skull of the type of *D. abrasus* and demonstrated that this speci-

men was not a *Eumops* but actually belonged to the genus *Cynomops* Thomas (1920). Thus Goodwin (1960) reassigned *V. auripendulus* to *E. auripendulus*. Consequently, *E. auripendulus* should be the name applied to these bats from the Guianas region.

Eumops auripendulus occurs from southern Mexico south to northern Argentina, and two specimens are known from Jamaica (9.1.4.48, British Museum (Natural History); no number, Institute of Jamaica). Sanborn (1932), in his review of the genus *Eumops*, listed two races of *E. abrasus* (= *E. auripendulus*) and assigned four specimens from eastern Brazil to *E. abrasus abrasus* and all other specimens to *E. abrasus milleri*. As *E. auripendulus* is the valid specific name, *E. abrasus milleri* is therefore synonymous with *E. auripendulus auripendulus*. In a recent review of the genus *Eumops* (Eger, 1973), I confirmed that Sanborn was correct in recognizing a distinct, isolated population of *E. auripendulus* in eastern Brazil. In this study 14 additional specimens of this population were identified and the distribution of the new subspecies, described herein, is known to extend southward to Misiones, Argentina.

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² Department of Mammalogy, Royal Ontario Museum, Toronto.

Materials and Methods—The 305 specimens examined were either study skins and skulls or specimens preserved in alcohol (some with skulls removed). Specimens examined are in the collections of the following institutions: American Museum of Natural History (AMNH); Academy of Natural Sciences of Philadelphia (ANSP); British Museum (Nat. Hist.) (BMNH); Carnegie Museum (CM); Field Museum of Natural History (FMNH); Institute of Jamaica (IJ); The Museum of Natural History, University of Kansas (KU); Los Angeles County Museum (LACM); Museum of Comparative Zoology, Harvard University (MCZ); Muséum National d'Histoire Naturelle, Paris and Brunoy (MNHN); Museum of Vertebrate Zoology, University of California, Berkeley (MVZ); Rijksmuseum van Natuurlijke Historie, Leiden (RMNH); Royal Ontario Museum (ROM); Texas Cooperative Wildlife Research Collection, Texas A&M University (TCWC); Universidade de São Paulo (USP); Universidad Nacional Autónoma de México (UNAM); and the National Museum of Natural History (USNM).

Thirty-eight morphometric characters were studied. Measurements, in millimetres (mm), were taken with dial calipers to the nearest 0.1 mm for wing bones, to the nearest 1.0 mm for body measurements, and to the nearest 0.05 mm for cranial measurements. The length of the tibia, often difficult to measure, was verified by radiographs where possible. Descriptions of pelage colour follow those given by Ridgway (1912).

Conventional morphological characters employed in chiropteran systematics were measured and are: *External* – Forearm (FOAR); metacarpals 3, 4, and 5 (3DME, 4DME, 5DME); phalanges 1 and 2 (1PHL, 2PHL) of third, fourth and fifth digits; total length (TLEN); tail vertebrae (TVER); hind foot, including claws (HDFT); ear from notch (EARS); tragus (TRAG); and tibia (TIBI). *Mandible* – Condylolincisive length (CIMA); greatest length (GRLG), measured from one condyle to anterior face of incisors; canine to third molar (C-M₃); width across canines (C₁-C₁), including cingula; and height of lower canines (HTLC), mea-

sured buccally from base of cingulum to crown. Broken or obviously worn teeth were not measured. *Skull* – Width of septum between basisphenoid pits (WBSP); length of basisphenoid pit (LBSP); total length (TOLG), measured from lambdoidal crest to anterior face of incisors; condylolincisive length (CBLG); palatal length (PALA), measured from anterior face of incisor to posterior margin of palate, lateral to posteromedial projection; zygomatic width (ZYGO); mastoid width (MAST); lachrymal width (LACH); interorbital width (IOWI); height of braincase (HBCA), measured from ventral border of foramen magnum to top of skull, not including sagittal crest; width across third molars (M³-M³); canine to third molar (C-M³); width across canines (C¹-C¹), including cingula; height of upper canines (HTUC), measured buccally from base of cingulum to crown; postorbital constriction (POCO); breadth of braincase (BBC1), anterior width of braincase measured where zygoma anastomose with parietals; and breadth of braincase (BBC2), measured dorsal to auditory bullae with blades of calipers resting on zygoma.

Localities of *E. auripendulus* (Fig. 1) are of specimens examined, records of immature specimens, and records from the literature. A study of sexual dimorphism of eight taxa indicated that male and female *Eumops* were dimorphic in a minimum of 26 per cent of the characters (Eger, 1973). Means and standard errors (S.E.) of all characters were calculated separately for males and females.

As *E. a. auripendulus* varies clinally, increasing in size from north to south (Eger, 1973), specimens from eastern Brazil and northern Argentina were compared only with those from the adjacent Amazon region of Brazil. Differences in character means were examined using Student's *t*-test (Sokal and Rohlf, 1969). Asterisks denote probability values as follows: *** = $P \leq 0.001$; ** = $P \leq 0.01$; * = $P \leq 0.05$; and ns = $P > 0.05$.

Eumops auripendulus major ssp. nov.

Holotype—ROM 50196, adult male, skin and skull, collected 17 April 1968 by H. Delpietro, purchased from Abel Fornes.



Fig. 1—Distribution of *Eumops a. auripendulus* and *E. a. major* in Middle and South America as determined from localities of specimens examined and from literature records.

Type locality—Campo Viera (27°15'S, 55°10'W), Misiones, Argentina.

Distribution—Northeastern Argentina and eastern Brazil (Fig. 1).

Description—Dorsal pelage Blackish-brown with pale basal band; ventral pelage Mummy Brown with white basal band; pinnae broad, arising from single point on forehead, united at base; tragus small and pointed; antitragus twice as broad as high; wing membranes furred proximal to forearm and on proximal ends of metacarpals; guard hairs on feet long. Dental formula $\frac{1}{2} \frac{1}{1} \frac{2}{2} \frac{3}{3}$; first upper premolar small, external to tooththrow; canine and

second premolar in contact; third commissure of third upper molar absent; basisphenoid pits shallow but well defined (Fig. 2B).

Measurements of the holotype—See Table 1.

Comparison—*Eumops auripendulus major* is similar in colour to *E. a. auripendulus* but statistically significantly larger in 27 of 38 characters in males and in 31 of 38 characters in females (Tables 1 and 2). Measurements of FOAR, 3DME, CIMA, GRLG, C-M₃, C-M³ (females only), TOLG, and CBLG do not overlap in specimens of the two subspecies.

Specimens examined—(Those used in analysis marked with †)

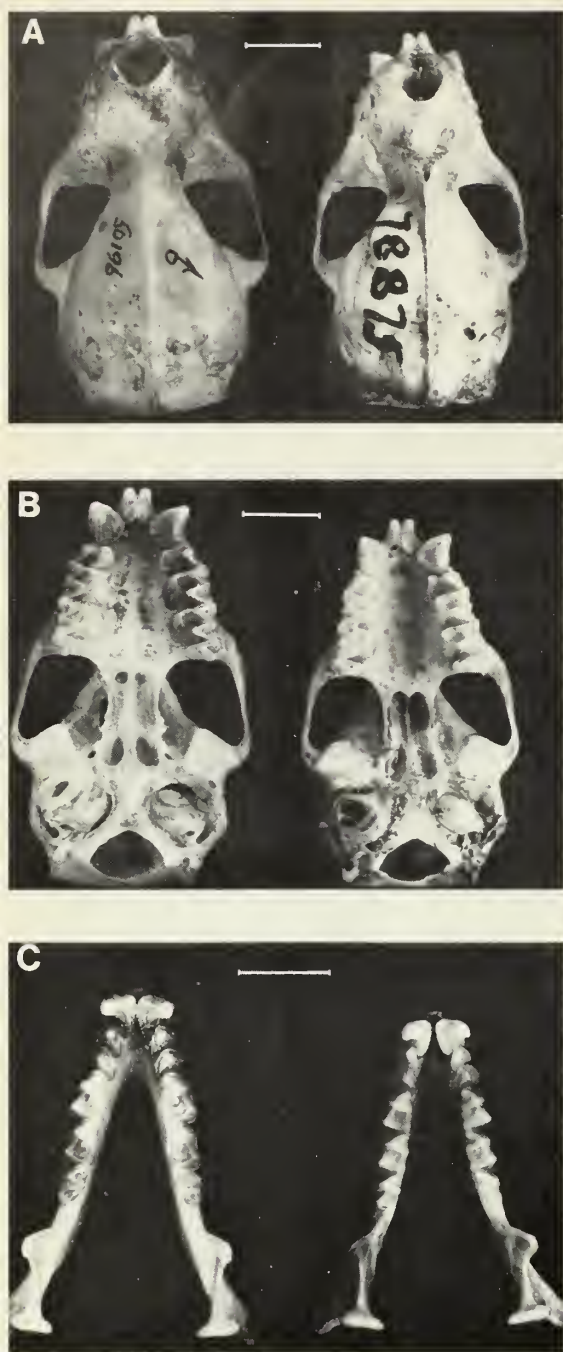


Fig. 2 (scale bars = 5 mm).—*Eumops auripendulus major* ssp. nov. Holotype, ROM 50196, adult male (left) and *E. a. auripendulus* AMNH 78875, adult male (right).

A. Dorsal view of skull. GRLG: 27.1 mm (left) and 25.3 mm (right).

B. Ventral view of skull. C-M³: 10.4 mm (left) and 9.4 mm (right).

C. Dorsal view of mandible. C-M₃: 11.7 mm (left) and 10.5 mm (right).

Eumops auripendulus major

ARGENTINA. Misiones: no locality, 1† (ROM); Bonpland (27°30'S, 56°0'W), 1† (ROM); Campo Viera (27°15'S, 55°10'W), 2† (ROM); Colonia Mártires (approx. 28°S, 56°W), 2† (ROM).

BRAZIL. Bahia: Lamarão (11°46'S, 38°53'W), 1 (BMNH).

Ceará: Baturité (4°20'S, 38°53'W), 1† (FMNH); Quixadá (4°58'S, 39°01'W), 2† (FMNH).

Espírito Santo: Santa Teresa (19°55'S, 40°36'W), 1† (USP).

Minas Gerais: Manejo (21°50'S, 45°44'W), 2† (MCZ).

São Paulo: Emas Pirassununga (21°56'S, 47°22'W), 1† (USP); Iporanga (24°35'S, 48°35'W), 1† (MCZ); Itapetininga (23°36'S, 48°07'W), 1† (MCZ); Juquiá (24°19'S, 47°38'W), 1† (USP); Ribeirão Preto (21°10'S, 47°48'W), 4† (USP); São Paulo (23°33'S, 46°39'W), 1† (USP).

Eumops auripendulus auripendulus

BOLIVIA. Beni: Camiaco, 16 km N Limoquique (= Limoquije) (15°15'S, 64°46'W), 1 (AMNH).

La Paz: Ixiamas (13°45'S, 68°10'W), 1 (USNM).

BRAZIL. No locality, 29† (MCZ); Lake Hyanuay, 1† (MCZ).

Acre: Plácido de Castro (10°20'S, 67°11'W), 10† (USP); Tarauacá (8°10'S, 70°46'W), 1† (USP).

Amazonas: Lagoa Anamá, Tacambú (2°35'S, 64°40'W), 1 (BMNH); Xingu (7°48'S, 68°45'W), 3† (LACM); Manacapuru (3°18'S, 60°37'W), 1 (BMNH); mouth of Lake Tefé (3°27'S, 64°47'W), 4† (AMNH).

Mato Grosso: São Domingos, Rio das Mortes (11°45'S, 50°44'W), 1† (USP).

Pará: Boim near Rio Tapajós (2°49'S, 55°10'W), 2† (USP); Pará (Belem) (1°27'S, 48°29'W), 1† (MCZ); Faro (2°10'S, 56°39'W), 7† (AMNH); Rio Tapajós, Limoãl (2°24'S, 54°41'W), 1† (AMNH); Morcêgo (0°58'S, 52°40'W), 1† (USP); Santarém (2°26'S, 54°41'W), 2† (MNH).

TABLE 1. Sample statistics and Student's *t*-tests of male *Eumops a. auripendulus* from the Amazon region of Brazil and male *E. a. major* from eastern Brazil and northeastern Argentina

Character	<i>E. a. auripendulus</i>				<i>E. a. major</i>			
	n	Mean	±S.E.	Holotype ROM 50196 ♂	n	Mean	±S.E.	Student's <i>t</i> value
FOAR	14	58.6	0.33	65.0	8	64.2	0.70	7.24***
3DME	16	60.6	0.46	65.7	8	66.1	0.49	7.38***
1PHL	16	25.5	0.21	28.3	8	28.3	0.30	7.91***
2PHL	16	23.3	0.22	23.7	8	25.6	0.37	5.65***
4DME	16	58.4	0.50	62.3	8	63.4	0.42	7.66***
1PHL	16	21.5	0.21	23.0	8	23.9	0.39	6.10***
2PHL	16	5.7	0.17	6.0	8	6.1	0.20	1.38 ns
5DME	16	32.8	0.25	35.3	8	35.9	0.54	5.30***
1PHL	16	17.6	0.15	19.4	7	19.3	0.24	6.15***
2PHL	16	5.5	0.07	5.0	8	6.0	0.20	2.42*
TLEN	2	146.0	—	149.0	5	144.0	2.86	—
TVER	4	47.8	2.84	55.0	6	55.2	2.02	2.19 ns
HDFT	6	11.7	0.76	11.0	5	12.6	1.03	0.74 ns
EARS	1	21.0	—	19.0	4	19.5	1.26	0.52 ns
TRAG	0	—	—	3.0	3	3.7	0.67	—
TIBI	10	16.1	0.25	18.4	6	18.3	0.44	4.79***
HTLC	6	4.1	0.03	4.8	4	4.8	0.08	7.35*
HTUC	5	4.2	0.08	4.6	4	4.6	0.12	3.31*
WBSP	6	0.6	0.04	0.7	6	0.8	0.06	2.57*
LBSP	6	1.8	0.12	2.2	6	2.0	0.15	1.21 ns
CIMA	5	17.4	0.16	18.9	5	18.7	0.14	6.03***
GRLG	6	17.8	0.17	19.4	6	19.1	0.15	5.48***
C-M ₃	6	10.6	0.09	11.7	6	11.4	0.09	6.26***
C ₁ -C ₁	6	3.9	0.19	4.5	9	3.9	0.06	2.11 ns
TOLG	6	25.4	0.11	27.1	6	27.2	0.23	7.30***
CBLG	5	23.4	0.24	25.1	6	25.0	0.15	5.94***
PALA	6	11.3	0.08	12.1	6	12.1	0.04	8.72***
ZYGO	6	14.4	0.15	15.7	6	15.4	0.10	5.21***
MAST	5	12.6	0.12	12.8	5	13.1	0.15	2.82*
LACH	6	8.2	0.21	8.3	6	8.6	0.08	1.50 ns
IOWI	6	7.9	0.14	8.2	6	8.2	0.07	1.37 ns
HBCA	6	8.7	0.10	9.0	6	9.2	0.07	4.52***
M ³ -M ³	6	10.1	0.13	11.0	6	10.7	0.07	3.97**
C-M ³	6	9.5	0.11	10.4	6	10.3	0.12	4.92***
C ¹ -C ¹	6	6.2	0.14	6.5	6	6.6	0.10	2.23*
POCO	6	4.8	0.08	4.7	6	4.7	0.06	0.50 ns
BBC1	5	10.8	0.14	11.1	5	11.1	0.09	2.30*
BBC2	6	11.5	0.09	12.3	6	12.2	0.13	4.60***

BRITISH HONDURAS. Rockstone Pond (17°46'N, 88°22'W), 1 (ROM).

COLOMBIA. Antioquia: Medellín (6°15'N, 75°36'W), 1 (BMNH).

Bolívar: Mompós (9°15'N, 74°35'W), 2 (USNM).

Cauca: Popayán (2°27'N, 76°22'W), 1 (ROM).

Magdalena: Don Diego (11°00'N, 73°43'W), 10 (CM).

Meta: Guacarano (4°35'N, 73°00'W), 4 (MCZ), 1 (AMNH); Villavicencio (4°09'N, 73°38'W), 1 (ROM), 2 (FMNH), 4 (AMNH).

Nariño: Barbacoas (1°38'N, 78°08'W), 8 (AMNH).

Valle del Cauca: Puerto Merizalde (3°16'N, 77°25'W), 1 (USNM).

COSTA RICA. Alajuela: 18 km NE Naranjo (9°56'N, 84°57'W), 15 (TCWC).

Cartago: Turrialba (9°56'N, 83°40'W), 11 (LACM), 2 (KU), 32 (TCWC).

Puntarenas: Villa Neily (10°00'N, 84°50'W), 2 (LACM); San José (9°59'N, 84°04'W), 1 (KU).

ECUADOR. Guayas: Balzar (1°25'S, 79°54'W), 1 (MNHN).

TABLE 2. Sample statistics and Student's *t*-tests of female *Eumops a. auripendulus* from the Amazon region of Brazil and female *E. a. major* from eastern Brazil and northeastern Argentina

Character	<i>E. a. auripendulus</i>			<i>E. a. major</i>			Student's <i>t</i> value
	n	Mean	± S.E.	n	Mean	± S.E.	
FOAR	43	58.1	0.21	10	63.4	0.47	10.80***
3DME	47	60.2	0.24	10	65.6	0.60	9.07***
1PHL	46	25.4	0.16	10	27.8	0.43	5.89***
2PHL	47	23.2	0.19	10	25.1	0.18	7.26***
4DME	47	57.9	0.25	10	63.1	0.56	8.77***
1PHL	46	21.4	0.15	10	23.6	0.32	6.14***
2PHL	47	5.5	0.08	10	6.4	0.23	3.81***
5DME	47	32.6	0.16	10	35.8	0.17	13.75***
1PHL	47	17.8	0.13	10	19.1	0.13	7.40***
2PHL	47	5.6	0.08	10	5.7	0.11	1.03 ns
TLEN	6	132.8	2.45	6	142.5	1.71	3.23**
TVER	17	45.2	0.79	7	53.0	2.64	2.85*
HDFT	28	11.0	0.32	9	11.9	0.65	1.25 ns
EARS	21	20.2	0.20	8	21.2	0.63	1.45 ns
TRAG	3	1.8	0.17	6	3.2	0.54	2.35 ns
TIBI	41	16.0	0.12	10	18.1	0.30	7.33***
HTLC	12	4.0	0.05	7	4.6	0.08	5.90***
HTUC	13	4.1	0.07	7	4.5	0.06	4.27***
WBSP	11	0.6	0.06	9	0.8	0.05	2.56*
LBSP	11	1.8	0.09	9	2.0	0.07	1.71 ns
CIMA	10	16.8	0.12	9	18.2	0.14	7.94***
GRLG	13	17.3	0.09	10	18.7	0.09	10.94***
C-M ₃	13	10.4	0.07	10	11.2	0.09	7.69***
C ₁ -C ₁	12	3.7	0.05	9	3.9	0.04	3.97***
TOLG	11	24.6	0.14	8	26.6	0.29	6.29***
CBLG	10	22.8	0.14	8	24.8	0.19	8.45***
PALA	12	10.9	0.07	10	11.7	0.15	5.22***
ZYGO	9	14.4	0.08	8	15.1	0.11	5.12***
MAST	9	12.3	0.05	8	13.0	0.12	5.23**
LACH	12	7.9	0.08	10	8.4	0.08	3.72**
IOWI	12	7.6	0.08	10	8.0	0.08	3.78**
HBCA	10	8.4	0.06	8	8.9	0.10	4.42***
M ³ -M ³	12	9.9	0.05	10	10.5	0.08	5.95***
C-M ³	13	9.4	0.05	9	10.1	0.08	8.43***
C ¹ -C ¹	11	6.0	0.06	10	6.4	0.05	5.38***
POCO	12	4.6	0.05	9	4.9	0.07	3.20**
BBC1	9	10.7	0.10	6	10.9	0.07	1.59 ns
BBC2	10	11.6	0.07	8	12.1	0.18	2.89*

Manabi: Rio Mongoya (0°10'S, 79°38' W), 3 (FMNH).

EL SALVADOR. Sonsonate: Chilata (13° 40'N, 89°32'W), 1 (MVZ).

FRENCH GUIANA. Cayenne (4°55'N, 52°18'W), 2 (MNH).

GUATEMALA. Cobán (15°28'N, 90°20' W), 1 (BMNH); Mazatenango (Finca Ciprés) (14°32'N, 91°30'W), 1 (AMNH).

GUYANA. Demerara: Demerara (Georgetown) (6°46'N, 58°10'W), 1 (BMNH).

Essequibo: Rupununi, Kanashen (1°45'

N, 58°30'W), 1 (ROM).

North West District: Arakaka (7°35'N, 60°07'W), 26 (AMNH); Mt. Everard, 3 (AMNH).

HONDURAS. Copán: Copán (Ruinas de Copán) (14°52'N, 89°10'W), 9 (TCWC).

7 km N Santa Bárbara (14°56'N, 88°11' W), 1 (TCWC).

JAMAICA. no locality, 1 (BMNH). Kingston (17°58'N, 76°48'W), 1 (IJ).

MEXICO. Oaxaca: Mazatlán, District of Mixes (17°02'N, 95°25'W), 1 (AMNH).

Quintana Roo: 16 km from Yucatán border, 1 (UNAM).

Tabasco: Teapa (18°35'N, 92°56'W), 1 (BMNH).

NICARAGUA. Mecatepe (11°58'N, 85°59'W), 1 (USNM). 1.5 km SE Yalaguina (13°20'N, 86°30'W), 1 (TCWC).

PANAMA. Bocas del Toro (archipelago): 7 km SSW Changuinola (9°28'N, 82°31'W), 1 (USNM).

Canal Zone: Bohío (9°10'N, 79°51'W), 13 (USNM); Empire (9°04'N, 79°40'W), 1 (USNM); Fort Clayton (Fort Kobbe) (9°00'N, 79°35'W), 2 (USNM); Frijoles (9°11'N, 79°48'W), 1 (USNM); Gamboa (9°08'N, 79°42'W), 1 (MVZ); Panama City (8°57'N, 79°30'W), 1 (MCZ); Paraiso (9°02'N, 79°38'W), 1 (USNM); Summit (9°04'N, 79°39'W), 1 (USNM).

Darién: Tacarcuna Village, 1 (USNM).

Panamá: Tapia (9°04'N, 79°25'W), 5 (MCZ).

PERU. Huánuco: Hacienda San Antonio, Río Chinchao (9°30'S, 75°56'W), 2 (FMNH); 3.2 km N Tingo María (9°09'S, 75°56'W), 1 (TCWC); Vista Alegre (9°55'S, 76°11'W), 2 (FMNH).

Junín: Perené (10°55'S, 75°15'W), 5 (USNM).

Loreto: Pucallpa (8°23'S, 74°32'W), 1 (FMNH).

Piura: 6.4 km W Suyu (4°33'S, 80°01'W), 2 (TCWC).

San Martín: Guayabamba (Santa Rosa de Huayabamba) (6°22'S, 77°25'W), 4 (AMNH).

SURINAM. Commewijne: Slootwijk (approx. 5°N, 55°W), 1 (RMNH).

Nickerie: Alalapadoo, N of Sipaliwini R. (approx. 2°30'N, 56°W), 6 (ROM). Plantation Wederzorg, not located, 1 (USNM).

Surinam: no locality, 1 (USNM); Paramaribo (5°52'N, 55°14'W), 2 (RMNH). Welgedacht C, S of Paramaribo, 1 (RMNH).

TRINIDAD. Blanchisseuse (10°47'N, 61°18'W), 1 (USNM).

VENEZUELA. Amazonas: San Fernando de Atabapo, Upper Orinoco River (4°03'N, 67°42'W), 2 (AMNH).

Bolívar: El Dorado, Río Cuyuni (6°45'N,

61°37'W), 9 (AMNH).

Carabobo: 10 km NW Urama, Río Yarecuy (10°30'N, 68°19'W), 4 (USNM).

Guárico: Parapara (9°44'N, 67°18'W), 1 (USNM).

Zulia: Lagunillas (10°08'N, 71°16'W), 1 (FMNH).

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Resumen—El murciélago mastín, *Eumops auripendulus* (Chiroptera: Molossidae) tiene una distribución desde México hasta Argentina. Cierta población del este del Brasil y del noreste de Argentina difiere morfológicamente de *E. a. auripendulus*. Describo aquí

tales quirópteros como una nueva subespecie, *E. a. major*, la cual se encuentra geográficamente aislada de la subespecie de menor tamaño *E. a. auripendulus*, que se distribuye desde la cuenca amazónica hasta el sur de México. La localidad típica de *E. a. major* es Campo Viera (27°15'S, 55°10'W) en Misiones, Argentina. El color del pelaje de esta nueva subespecie es similar al de *E. a. auripendulus* pero *E. a. major* es significativamente de mayor tamaño ($P \leq 0.05$) en 27

de las 38 características mensurales en los machos y en 31 de 38 en las hembras. Las características que distinguen principalmente estas dos subespecies son: la longitud del antebrazo y del tercer metacarpo; la longitud condilo incisiva y de la mandíbula; la longitud de la hilera inferior de dientes; la longitud mayor y la condilo incisiva del cráneo y la longitud superior de dientes, pero esta última característica de diferenciación se aplica solamente a las hembras.

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